member selected from ethylene/alpha-olefin copolymer, ethylene homopolymer, and blends thereof.

17. The foam of claim 16, wherein the blend further includes an aging modifier selected from at least one fatty acid ester, fatty acid amide, or hydroxyl amide.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. Such attachment is captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE."

REMARKS

Claims 1-5, and 8-14 stand rejected under 35 USC 103(a) as being unpatentable over Sakamoto (US 5,346,926). Sakamoto discloses a process for producing an expanded polyethylene blend of low density polyethylene (LDPE) and high density polyethylene (HDPE) by employing a chemical blowing agent and a certain low molecular weight polyolefin wax. By employing chemical blowing agents, Sakamoto is able to achieve an expansion ratio of no greater than 63.6% (see Examples 1-4 of Sakamoto).

The presently claimed foam, on the other hand, is a much different foam in that it has a far higher expansion ratio than Sakamoto's foam, ranging from 600% to 9000%, based on the claimed density range of 10 to 160 kg/m^3. This is discussed at paragraph 4 of the accompanying Declaration of Shau-Tarng Lee and Natarajan S. Ramesh.

As discussed at paragraph 6 of the Declaration, with such higher expanding/lower density foams as claimed, foam collapse is a significant problem, particularly when using blends of LDPE and HDPE or other higher density polyethylenes (collectively referred to as "HDPEs" for clarity). Foam collapse is of insignificant concern with lower

expanding/higher density foams such as Sakamoto's, in which higher density is necessary for the wire insulation applications to which Sakamoto is directed. The inventors found, unexpectedly, that foam collapse in highly expanded foams can be greatly reduced by using HDPEs that have a relatively high melt index (MI), generally in excess of about 20 g/10 min (see paragraphs 7 - 8 of the Declaration)[1]. Moreover, blend foams made with such 'high-MI HDPEs' have better quality and mechanical properties than foams made from LDPE alone, as demonstrated in the Examples of the present application. New claim 16 has been added in order to specify such foams made from blends of LDPE and HDPEs having a MI greater than about 20, i.e., ranging from about 23 to about 69. Support for the new claim may be found in the specification at page 5, lines 1-20. Sakamoto does not teach blends made with such higher melt index polyethylenes, nor does it recognize the advantages of such blends for making high expansion/low density foams. Accordingly, new claim 16 is submitted to be patentably distinct from Sakamoto.

The Declaration further establishes the additional benefits resulting from the inclusion of aging modifiers to LDPE/HDPE blend foams, such as a fatty acid ester, fatty acid amide, or hydroxyl amide (see paragraph 9 of the Declaration). Independent claims 1 and 8, as well as new dependent claim 17, have been amended to specify the inclusion of such aging modifiers. Support for the amendment may be found in the specification at page 7, lines 11-15. Such aging modifiers, and their beneficial effect on foam collapse, are neither taught nor suggested in Sakamoto. Accordingly, claims 1 and 8 as now presented are submitted to be allowable over Sakamoto.

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[1] Because the executed copy of the Declaration was received from the declarants by facsimile, a reprinted but identical copy of the table from paragraph 7 of the Declaration

For all of the foregoing reasons, Applicants submit that the claims as now presented are patentably distinct from the references of record and are, therefore, in condition for allowance. A Notice of Allowance is earnestly solicited.

Respectfully submitted,

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DECEMBER 18, 2001
Date

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is included herewith to enhance the clarity and readability of the table.

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In th claims:

Claims 1 and 8 have been amended to read as follows:

1. (Twice Amended) A foam having a density ranging from about 10 to about 160 kg/m^3 and produced from a physical blowing agent, comprising a blend of an aging modifier selected from at least one fatty acid ester, fatty acid amide, or hydroxyl amide, a low density polyethylene, and an ethylene polymer having a density ranging from greater than 0.94 to about 0.97 grams/cubic centimeter and a melt flow index of greater than 10 g/10 minutes, said ethylene polymer comprising at least one member selected from ethylene/alpha-olefin copolymer, ethylene homopolymer, and blends thereof.

8. (Twice Amended) A method of making a foam, comprising:

a. blending an aging modifier selected from at least one fatty acid ester, fatty acid amide, or hydroxyl amide, a low density polyethylene, and an ethylene polymer having a density ranging from greater than 0.94 to about 0.97 grams/cubic centimeter and a melt flow index of greater than 10 g/10 minutes, said ethylene polymer comprising at least one member selected from ethylene/alpha-olefin copolymer, ethylene homopolymer, and blends thereof;

b. adding a physical blowing agent to said blend; and

c. causing said blowing agent to expand within said blend, thereby forming a foam, whereby, said foam has a density ranging from about 10 to about 160 kg/m^3.

In addition, new claims 16 and 17 have been added.

Reprinted Copy of the Table from Paragraph 7 of the Declaration

Foam Sample	Description	Density kg/m³	Parts LDPE	Parts HiMI-HDPE	Parts LoMI-HDPE	Parts GMS	Results
1	LDPE with GMS (*Comparative*)	35.3	100	0	0	1	Excellent foam with good closed cells.
2	LDPE/HiMI-HDPE blend with GMS	48.1	70	30	0	1	Excellent foam with good cells and smooth surface. Better than LDPE foam in post-cooling stability.
3	LDPE/LoMI-HDPE blend with GMS (*Comparative*)	64.1	70	0	30	1	Collapsed foam with highly visible open cells present.
4	LDPE/ HiMI-HDPE blend with No GMS (*Comparative*)	75.3	70	30	0	0	Collapsed Foam with highly visible open cells present.
5	LDPE/ LoMI-HDPE blend with No GMS (*Comparative*)	131.4	70	0	30	0	Heavy collapsing after die exit. Very poor foam.

1) LDPE is ExxonMobil LD120 low density polyethylene having a melt index of 2 g/10 min and a density of 0.919 g/cc.
2) "HiMI-HDPE" is SCLAIR 2514 ethylene/butene copolymer having 6.3 butene groups per 1000 carbon atoms (2.5% by weight butene), a density of 0.941 g/cc, and a melt index of 45 g/10 min; from Nova Chemicals.
3) "LoMI-HDPE" is HCX002 polyethylene homopolymer having a density of 0.94 g/cc and a melt index of 4 g/10 min; from ExxonMobil.
4) "GMS" is glycerol monostearate, a fatty acid ester aging modifier.

EXPRESS MAIL CERTIFICATE
I HEREBY CERTIFY THAT THIS C RRESPONDENCE IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE AS FIRST CLASS MAIL, POSTAGE PREPAID, IN AN ENVELOPE ADDRESSED TO: COMMISSIONER FOR PATENTS, WASHINGTON, D.C. 20231, ON THE DATE NOTED BELOW MY SIGNATURE

Margaret B. White

Margaret B. White

12-18-01

DATE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Lee et al. Group Art Unit: 1711

Serial No.: 09/586,493 Examiner: M. Bagwell

Filing Date: June 2, 2000 Docket No.: D-30207-01

Title: FOAM COMPRISING POLYOLEFIN BLEND AND METHOD FOR PRODUCING SAME

DECLARATION UNDER 37 CFR §1.132

We, Shau-Tarng Lee ("S. T. Lee") and Natarajan S. Ramesh ("N. S. Ramesh"), declare the following:

1. We are the named inventors in the above-identified patent application.

2. I, S. T. Lee, received a Ph.D. Degree in Chemical Engineering from Stevens Institute of Technology, Hoboken, New Jersey in 1986; a Master of Engineering Degree from the same Department and Institute in 1982, and a Bachelor of Engineering Degree in Industrial Chemistry from National Tsing Hua University, Hsin-Chu, Taiwan, ROC, in 1978. I have been employed by Sealed Air Corporation since 1986 as a researcher in the field of polyolefin foam extrusion.

3. I, N. S. Ramesh, received a PhD in Chemical Engineering from Clarkson University, Potsdam, NY, in 1992; a M.S. Degree in Chemical Engineering from Clarkson University, Potsdam, NY, in 1985; and a B.Tech degree in Chemical Engineering from the Coimbatore Institute of Technology, which is affiliated with the University of Madras, Madras, India, in 1982. I have been employed by Sealed Air Corporation since 1992 as a researcher in the field of polyolefin-based foams.

4. We have read and understand the disclosure set forth in U.S. Pat. No. 5,346,926 (Sakamoto et al.). The foams disclosed in Sakamoto are prepared with a chemical blowing agent and achieve an expansion ratio of no greater than 63.6%. This is quite different from the foams claimed in our patent application, which have a much higher expansion ratio. Our claimed foams have a density ranging from 10 to 160 kg/m^3, which corresponds to an expansion ratio of 600% to 9000%.

5. The more highly expanded/lower density foams of our invention would not be suitable for Sakamoto's invention, in which polyethylene foam is used as insulation for small diameter electric wire. For such wire insulation, a higher density foam as taught by Sakamoto is required.

6. One of the major challenges encountered in making polyethylene foams having such high expansion ratios (lower densities) is preventing the foam from collapsing. The gas-containing cells in highly expanded foams are formed by the rapid expansion of a gaseous blowing agent in molten polyethylene, which cools to foam a solidified cellular matrix, with the cells being supported by relatively thin walls of polyethylene. Such cells have a tendency to collapse shortly after the foam is made because of the tendency of the blowing agent to escape the cells faster than air can

replace the escaping blowing agent. As a result, a partial vacuum forms inside the cells, thereby leading to foam collapse, especially when the cells are not formed properly and do not have good structural integrity. The problem of foam collapse was found to worsen when low density polyethylene (LDPE) was blended with high density polyethylene (HDPE), leading to the problems described in the Background of the application (poor quality, high percentage of open cells, etc.). This is believed to be due to differences in extensional viscosities, molecular structure and crystallization kinetics between LDPE and HDPE. When LDPE and HDPE are blended and foams are made with such blends, the differences between these polymers were found to result in poor cell structure, cell coalescence and thinning of the cell walls, all of which cause a very high percentage of open cells and foam collapse due to rapid escape of blowing agent from the cells.

7. Surprisingly, we found that, not only could the foam-collapse problem be avoided, but superior quality foams could be produced when using HDPEs having a relatively high melt index. The most beneficial results were found when the melt index exceeded about 20 g/10 min (see the Examples in the application). In order to clearly demonstrate this, a number of extruded foam samples were prepared using a Haake Rheocord 90 twin-screw extruder, with isobutane blowing agent and talc nucleating agent. The extrusion rate ranged from between 2.4 and 2.9 pounds/hour. The results are summarized in the following table.

Foam Sample	Description	Density kg/m³	Parts LDPE	Parts HiMI-HDPE	Parts LoMI-HDPE	Parts GMS	Results
1	LDPE with GMS *(Comparative)*	35.3	100	0	0	1	Excellent foam with g od closed cells.

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4) "GMS" is glycerol monostearate, a fatty acid ester aging modifier.

8. In comparing Samples 1, 2 and 3, it may be seen that Sample 3, made with a blend of LDPE and HDPE having a melt index of 4 ("LoMI-HDPE"), produced a collapsed foam. In contrast, Sample 2 was made in accordance with our invention, i.e., from a blend of LDPE and HDPE having a high melt index (45 g/10 min.). Such blend of LPDE and "HiMI-HDPE" resulted in a foam of excellent quality and with a high degree of post-cooling stability, i.e., little or no collapse. Such foam was even better in this regard than the foam of Sample 1, which included LDPE with no HDPE blended in.

9. We have also discovered another important factor in preventing foam collapse in foams made with blends of LDPE and HDPE, namely, that adding an aging modifier, such as GMS fatty acid ester, to a blend of LDPE and high MI HDPE leads to superior foams. This is shown by comparing

the results of Sample 2 with Sample 4 and by comparing the results of Sample 3 with Sample 5. As demonstrated, synergistic eff cts resulted from blending both high MI HDPE and an aging modifier with LDPE.

10. We further declare that all statements made herein of our own knowledge are true, and that all statements made herein on information and belief are believed to be true. Such statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both (18 U.S.C. 1001) and may jeopardize the validity of the present application or any patent issuing therefrom.

Declared this 17 th day of December, 2001

Shau-Tarng Lee

Natarajan S. Ramesh